

SHORT COURSE
ON
NEAR NET SHAPE COLD, WARM AND HOT FORGING WITHOUT FLASH
FUNDAMENTALS AND APPLICATIONS

August 2002

The attendees will receive 1) a Workshop booklet that contains all the slides used in the class, and 2) a CD that contains figures, text and animations that will be used in the class.

COURSE CONTENT

1. Introduction/ Forging Processes

- Introduction
- Types of Forging Processes

2. Forging Process as a System

- Process & Equipment Variables in Forging

3. Properties of the Billet Materials

- Forgeability
- Plastic Deformation
- Flow Stress
 - Appendix A – Determination of Flow Stress at Room Temperature
 - Appendix B – Determination of the Damage Factor
 - Appendix C – Tensile Test

4. Friction and Lubrication

- Forging as a System
- Friction & Lubrication
- Parameters that Influence Friction
- Surface Finish
- Lubrication
- Characteristics of Lubricants/ Coefficient of Friction
- Die Wear
 - Appendix A – Ring Compression Test
 - Appendix B – Double Cup Extrusion Test

5. Precision Cold and Warm Forging

- Precision Cold Forging
- Precision Warm Forging
- Competing Processes
- Auxiliary Equipment in Forging
- Multiple Action Tooling
- Precision Forming Applications²
- Example Simulations
 - Appendix A – Upset Forging of Cylinders
 - Appendix B – Cold Extrusion: Part I – Forward Extrusion
 - Appendix C – Cold Extrusion: Part II – Backward Extrusion

7. Design Guidelines for Cold and Warm Extrusion

- Applications for Cold Forging
- Forming Sequence Design
- Advantages & Limitations of Cold Forging
- Materials used in Cold Forging
- Defects in Cold Forging
- Case Studies

8. Examples of Cold/ Warm Forging Sequences

9. Die Failure

- Modes of Die Failure
- Die Failure in Hot & Cold Forging
- Predictive Models for Die Wear Prediction
- Surface Engineering Techniques

10. Forging Equipment

- Principles of Forging Machines
- Classification & Characteristics of Forging Machines
- Presses & Hammers for Cold & Hot Forging
 - Appendix A – Forging Equipment

11. Process Monitoring and Equipment

- Introduction
- Process Monitoring & Control of Forging Presses
- Machine Process Monitoring & Control

12. Forging of Aluminum Alloys

13. Summary & Outlook

Scroll Down for Course Fees and a List of Past Events organized by ERC/NSM

COURSE FEES

A. When the course is given at a hotel or university, or in cooperation with a conference:

Per person: \$ 495.00 – includes a booklet that contains black & white copies of the slides used.
Optional: \$ 50.00 – per copy of a CD (that contains the power point slides, animations and other forging modules).

B. When the course is given at a company location:

Per person: \$ 450.00 – includes a booklet that contains black & white copies of the slides used and one copy of a CD (that contains the power point slides, animations and other forging modules).
Minimum of 8 people (or \$3600) plus travel expenses for the instructor.

C. The course is provided on a CD only:

It is possible to purchase this course, together with appropriate modules, on CD (that contains the power point slides, animations and other forging modules). The cost will be \$450 per CD + \$15 shipping and handling.

For further information please contact ERC/NSM Office:

Ms. Linda Anastasi
ERC/NSM
339 Baker Systems
1971 Neil Avenue
Columbus, Ohio 43210
Phone: 614 292 6468
Fax: 614 2927219

Email: anastasi.2@osu.edu

Website: <http://www.ercnsm.org>

PAST EVENTS

36th International Cold Forging Group Plenary Meeting, August 31-September 2, 2003, Columbus, Ohio

International Cold Forging Conference & Short Course, September 2-4, 2003, Columbus, Ohio

Forging Technology Solutions Conference and Short Course on Precision Hot and Cold Forging, Sponsored by SME and ERC/NSM October 1-3, 2001, Columbus, Ohio

The 6th International Precision Forging Technology Conference / Short Course on Warm and Cold Forging, Sponsored by: SME and ERC/NSM November 9, 2000, Columbus, Ohio

The 5th International Precision Forging Technology Conference and Exhibits, Sponsored by: ERC/NSM and SME October 4-6, 1999, Detroit, Michigan

The 4th International Precision Forging Technology Conference and Exhibits, Sponsored by: ERC/NSM and SME October 12-14, 1998, Columbus, Ohio

Engineering Research Center for Net Shape Manufacturing
Rm.339 Baker Systems, 1971 Neil Avenue
Columbus, OH 43210
Phone: (614) 292 9267 Fax: (614) 292 7219
<http://www.ercnsm.org>

© Copyright Engineering Research Center for Net Shape Manufacturing, 2002. All rights reserved.



**Engineering Research Center for Net Shape Manufacturing
The Ohio State University**

ERC
NSM

The 3rd International Cold & Warm Forging Technology Conference, Sponsored by ERC/NSM and SME October 7-9, 1996, Columbus, Ohio

The 2nd International Cold & Warm Forging Technology Conference and Exhibits, Sponsored by: ERC/NSM and SME September 27-29, 1994, Columbus, Ohio

The 1st International Cold & Warm Forging Technology Conference, Sponsored by ERC/NSM and SME October 26-28, 1992, Columbus, Ohio

Engineering Research Center for Net Shape Manufacturing
Rm.339 Baker Systems, 1971 Neil Avenue
Columbus, OH 43210
Phone: (614) 292 9267 Fax: (614) 292 7219
<http://www.ercnsm.org>

© Copyright Engineering Research Center for Net Shape Manufacturing, 2002. All rights reserved.
